UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
HUMAN EXPOSURE & ATMOSPHERIC SCIENCES DIVISION (MD-D205-03)
Research Triangle Park, NC 27711
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Office of
Research and Development

LIST OF DESIGNATED REFERENCE AND EQUIVALENT METHODS

Issue Date: **May 5, 2003**
(www.epa.gov/ttn/amtic/criteria.html)

These methods for measuring ambient concentrations of specified air pollutants have been designated as "reference methods" or "equivalent methods" in accordance with Title 40, Part 53 of the Code of Federal Regulations (40 CFR Part 53). Subject to any limitations (e.g., operating range or temperature range) specified in the applicable designation, each method is acceptable for use in state or local air quality surveillance systems under 40 CFR Part 58 unless the applicable designation is subsequently canceled. Automated methods for pollutants other than PM_{10} are acceptable for use only at shelter temperatures between 20°C and 30°C and line voltages between 105 and 125 volts unless wider limits are specified in the method description.

Prospective users of the methods listed should note (1) that each method must be used in strict accordance with its associated operation or instruction manual and with applicable quality assurance procedures, and (2) that modification of a method by its vendor or user may cause the pertinent designation to be inapplicable to the method as modified. (See Section 2.8 of Appendix C, 40 CFR Part 58 for approval of modifications to any of these methods by users.)

Further information concerning particular designations may be found in the *Federal Register* notice cited for each method or by writing to the National Exposure Research Laboratory, Human Exposure and Atmospheric Sciences Division (MD-46), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Technical information concerning the methods should be obtained by contacting the source listed for each method. Source addresses are listed at the end of the listing of methods, except for the addresses for lead method sources, which are given with the method. New analyzers or PM_{10} samplers sold as reference or equivalent methods must carry a label or sticker identifying them as designated methods. For analyzers or PM_{10} samplers sold prior to the designation of a method with the same or similar model number, the model number does not necessarily identify an analyzer or sampler as a designated method. Consult the manufacturer or seller to determine if a previously sold analyzer or sampler can be considered a designated method or if it can be upgraded to designation status. Analyzer users who experience operational or other difficulties with a designated analyzer or sampler and are unable to resolve the problem directly with the instrument manufacturer may contact EPA (preferably in writing) at the above address for assistance.

This list will be revised as necessary to reflect any new designations or any cancellation of a designation currently in effect. The most current revision of the list will be available for inspection at EPA's Regional Offices, and copies may be obtained at the Internet site identified above or by writing to the National Exposure Research Laboratory at the address specified above.

Most Recent Designations

Environnement S.A Model CO12M Carbon Monoxide Analyzer	June 24, 2002
Environnement S.A Model $O_3$42M Ozone Analyzer	June 24, 2002
Environnement S.A Model AF22M Sulfur Dioxide Analyzer	Sept. 12, 2002
Teledyne - Advanced Pollution Instrumentation Model 400E O_3 Analyzer	Sept. 12, 2002
Thermo Andersen Series FH 62 C14 Continuous PM10 Monitor	Dec. 11, 2002
Teledyne-Advanced Pollution Instrumentation Model 200E NO_x Analyzer	Mar. 07, 2003
Teledyne-Advanced Pollution Instrumentation Model 100E SO_2 Analyzer	Mar. 07, 2003

PARTICULATE MATTER - TSP

Reference Method for TSP *Manual Reference Method:* **40 CFR Part 50, Appendix B**
Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method)
[Federal Register: Vol 47, page 54912, 12/06/82 and Vol 48, page 17355, 04/22/83]

PARTICULATE MATTER - PM_{10}

Andersen Model RAAS10-100 PM10 Single Channel PM_{10} Sampler *Manual Reference Method:* **RFPS-0699-130**
"Andersen Instruments, Incorporated Model RAAS10-100 Single Channel Reference Method PM_{10} Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods at a flow rate of 16.67 liters/ minute, and in accordance with the Model RAAS105-100 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J or Appendix M.
[*Federal Register:* Vol 64, page 33481, 06/23/99]

Andersen Model RAAS10-200 PM10 Single Channel PM_{10} Audit Sampler *Manual Reference Method:* **RFPS-0699-131**
"Andersen Instruments, Incorporated Model RAAS10-200 Single Channel Reference Method PM_{10} Audit Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS105-200 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J or Appendix M.
[*Federal Register:* Vol 64, page 33481, 06/23/99]

Andersen Model RAAS10-300 PM10 Multi Channel PM_{10} Sampler *Manual Reference Method:* **RFPS-0699-132**
"Andersen Instruments, Incorporated Model RAAS10-300 Multi Channel Sequential Reference Method PM_{10} Sampler," with RAAS-10 PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods at a flow rate of 16.67 liters/ minute, and in accordance with the Model RAAS105-300 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix J or Appendix M.
[*Federal Register:* Vol 64, page 33481, 06/23/99]

BGI Incorporated Model PQ100 Air Sampler *Manual Reference Method:* **RFPS-1298-124**
"BGI Incorporated Model PQ100 Air Sampler" with BGI 16.7 Inlet Kit or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, for 24-hour continuous sample periods at a flow rate of 16.7 liters/minute, operated in accordance with the Model PQ100 Instruction Manual and with the requirements specified in 40 CFR Part 50, Appendix J or Appendix M, using either the original or the newer PQ200-type filter cassettes, and with or without the optional Solar Panel Power Supply. [*Federal Register:* Vol 63, page 69625, 12/17/98]

BGI Incorporated Model PQ200 Air Sampler *Manual Reference Method:* **RFPS-1298-125**
"BGI Incorporated Model PQ200 Air Sampler" with "flat plate" PM_{10} inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods in accordance with the Model PQ200 Instruction Manual and with the requirements specified in 40 CFR Part 50, Appendix J or Appendix M, and with or without the optional Solar Panel Power Supply. [*Federal Register:* Vol 63, page 69625, 12/17/98]

Graseby Andersen/GMW Model 1200 High-Volume Air Sampler *Manual Reference Method:* **RFPS-1287-063**
Sierra-Andersen or General Metal Works Model 1200 PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen or General Metal Works Model 1200 PM_{10} Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.
[*Federal Register:* Vol 52, page 45684, 12/01/87 and Vol 53, page 1062, 01/15/88]

Graseby Andersen/GMW Model 321-B High-Volume Air Sampler *Manual Reference Method:* **RFPS-1287-064**

"Sierra-Andersen or General Metal Works Model 321-B PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen or General Metal Works Model 321-B PM_{10} Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.

[*Federal Register:* Vol 52, page 45684, 12/01/87 and Vol 53, page 1062, 01/15/88]

Graseby Andersen/GMW Model 321-C High-Volume Air Sampler *Manual Reference Method:* **RFPS-1287-065**

"Sierra-Andersen or General Metal Works Model 321-C PM_{10} High-Volume Air Sampler System," consisting of a Sierra-Andersen General Metal Works Model 321-C PM_{10} or Size-Selective Inlet and any of the high-volume air samplers identified as SAUV-10H, SAUV-11H, GMW-IP-10, GMW-IP-10-70, GMW-IP-10-801, or GMW-IP-10-8000, which include the following components: Anodized aluminum high-volume shelter with either acrylonitrile butadiene styrene plastic filter holder and motor/blower housing or stainless steel filter holder and phenolic plastic motor/blower housing; 0.6 hp motor/blower; pressure transducer flow recorder; either an electronic mass flow controller or a volumetric flow controller; either a digital timer/programmer, seven-day mechanical timer, six-day timer/programmer, or solid-state timer/programmer; elapsed time indicator; and filter cartridge.

[*Federal Register:* Vol 52, page 45684, 12/01/87 and Vol 53, page 1062, 01/15/88]

Graseby Andersen/GMW Models SA241 and SA241M Dichotomous Sampler *Manual Reference Method:* **RFPS-0789-073**

"Sierra-Andersen Models SA241 and SA241M or General Metal Works Models G241 and G241M PM_{10} Dichotomous Samplers," consisting of the following components: Sampling Module with SA246b or G246b 10 µm inlet or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, 2.5 µm virtual impactor assembly, 37 mm coarse and fine particulate filter holders, and tripod mount; Control Module with diaphragm vacuum pump, pneumatic constant flow controller, total and coarse flow rotameters and vacuum gauges, pressure switch (optional), 24-hour flow/event recorder, digital timer/programmer or 7-day skip timer, and elapsed time indicator. [*Federal Register:* Vol 54, page 31247, 07/27/89]

Graseby Andersen/GMW Model FH621-N Beta Monitor *Automated Equivalent Method:* **EQPM-0990-076**

"Andersen Instruments Model FH62I-N PM_{10} Beta Attenuation Monitor," consisting of the following components: FH101 Vacuum Pump Assembly; FH102 Accessory Kit; FH107 Roof Flange Kit; FH125 Zero and Span PM_{10} Mass Foil Calibration Kit; FH62I Beta Attenuation 19-inch Control Module; SA246b PM_{10} Inlet (16.7 liter/min) or the louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19; operated for 24-hour average measurements, with an observing time of 60 minutes, the calibration factor set to 2400, a glass fiber filter tape, an automatic filter advance after each 24-hour sample period, and with or without either of the following options: FH0P1 Indoor Cabinet; FH0P2 Outdoor Shelter Assembly. [*Federal Register:* Vol 55, page 38387, 09/18/90]

Met One or Sibata Models BAM/GBAM 1020, BAM/GBAM 1020-1 *Automated Equivalent Method:* **EQPM-0798-122**

"Met One Instruments or Sibata Scientific Technology Models BAM 1020, GBAM 1020, BAM 1020-1, and GBAM 1020-1 PM10 Beta Attenuation Monitor," including the BX-802 sampling inlet, operated for 24-hour average measurements, with a filter change frequency of one hour, with glass fiber filter tape, and with or without any of the following options: BX-823, tube extension; BX-825, heater kit; BX-826, 230 Vac heater kit; BX-828, roof tripod; BX-902, exterior enclosure; BX-903, exterior enclosure with temperature control; BX-961, mass flow controller; BX-967, internal calibration device. [*Federal Register:* Vol 63, page 41253,08/03/98]

Oregon DEQ Medium Volume PM_{10} Sampler *Manual Reference Method:* **RFPS-0389-071**

"Oregon DEQ Medium Volume PM_{10} Sampler." NOTE: This method is not now commercially available.

[*Federal Register:* Vol 54, page 12273,03/24/89]

Rupprecht & Patashnick TEOM Series 1400/1400a PM_{10} Monitors *Automated Equivalent Method:* **EQPM-1090-079**

"Rupprecht & Patashnick TEOM Series 1400 and Series 1400a PM-10 Monitors" (including serial number prefixes 1400, 140A, 140AA, 140AB, 140AT, and 140UP), consisting of the following components: TEOM Sensor Unit; TEOM Control Unit; Flow Splitter (3 liter/min sample flow); Teflon-Coated Glass Fiber Filter Cartridges; Rupprecht & Patashnick PM-10 Inlet (part number 57-00596), Sierra-Andersen Model 246b PM-10 Inlet (16.7 liter/min) or louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19; operated for 24-hour average measurements, with the total mass averaging time set at 300 seconds, the mass rate/mass concentration averaging time set at 300 seconds, the gate time set at 2 seconds, and with or without any of the following options: Tripod; Outdoor Enclosure; Automatic Cartridge Collection Unit (Series 1400a only); Flow Splitter Adapter (for 1 or 2 liter/min sample flow).

[*Federal Register:* Vol 55, page 43406, 10/29/90]

Rupprecht & Patashnick Partisol Model 2000 Air Sampler *Manual Reference Method:* **RFPS-0694-098**

"Rupprecht & Patashnick Partisol Model 2000 Air Sampler," consisting of a Hub Unit and 0, 1, 2, or 3 Satellite Units, with each sampling station used for PM_{10} measurements equipped with a Rupprecht & Patashnick PM-10 inlet and operated for continuous 24-hour periods using the Basic, Manual, Time, Analog Input, or Serial Input programming modes, and with or without any of the following options: $PM_{2.5}$- style filter cassette holder; louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19 in lieu of standard inlet; 57-002320 Stand for Hub or Satellite; 59-002542 Advanced EPROM; 10-001403 Large Pump (1/4 hp); 120 VAC. Hardware for Indoor Installation consists of: 51-002638-xxxx Temperature Sensor (Extended Length); 55-001289 Roof Flange (1 1/4"); 57-000604 Support Tripod for Inlet; 57-002526-0001 Sample Tube Extension (1 m); 57-002526-0002 Sample Tube Extension (2 m). Hardware for Outdoor Installation in Extreme Cold Environments consists of: 10-002645 Insulating Jacket for Hub Unit.

[*Federal Register:* Vol 59, page 35338, 07/11/94]

Rupprecht and Patashnick Co. Partisol®-FRM Model 2000 PM_{10} Air Sampler *Manual Reference Method:* **RFPS-1298-126**

"Rupprecht and Patashnick Company Partisol®-FRM Model 2000 PM_{10} Air Sampler" with PM10 inlet or louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods in accordance with the Model 2000 Instruction Manual and with the requirements specified in 40 CFR Part 50, Appendix J or Appendix M. [*Federal Register:* Vol 63, page 69625, 12/17/98]

Rupprecht and Patashnick Partisol®-Plus Model 2025 PM_{10} Seq. Air Sampler *Manual Reference Method:* **RFPS-1298-127**

"Rupprecht and Patashnick Company Partisol®-Plus Model 2025 PM_{10} Sequential Air Sampler" with PM_{10} inlet or louvered inlet specified in 40 CFR 50 Appendix L, Figs. L-2 thru L-19, configured as a PM_{10} reference method, and operated for 24-hour continuous sample periods in accordance with the Model 2025 Instruction Manual and with the requirements specified in 40 CFR Part 50, Appendix J or Appendix M. [*Federal Register:* Vol 63, page 69625, 12/17/98]

Thermo Andersen Series FH 62 C14 Continuous PM10 Monitor *Automated Equivalent Method:* **EQPM-1102-150**

"Thermo Andersen Series FH 62 C14 Continuous PM10 Ambient Particulate Monitor," operated for 24-hour average measurements, with the specified 10-micron inlet, inlet connector, sample tube with heater, roof flange kit, mass foil kit, pump kit, sample filter tape; with operational settings of 1000 L/h (16.67 L/min) sample flow rate, daily filter change, auto filter change at volumetric flow < 950 L/h, auto filter change at mass > 1500 micrograms, and factory default calculation mode settings; and with operational calibration and servicing as outlined in the Operator Manual. [*Federal Register:* Vol 67, page 76174, 12/11/02]

Tisch Environmental Model TE-6070 PM10 High-Volume Air Sampler *Manual Reference Method:* **RFPS-0202-141**

"Tisch Environmental Model TE-6070 PM10 High-Volume Air Sampler," consisting of a TE-6001 PM10 size-selective inlet, 8" x 10" filter holder, aluminum outdoor shelter, mass flow controller or volumetric flow controller with brush or brushless motor, 7-day mechanical off/on-elapsed timer or 11-day digital off/on-elapsed timer, and any of the high volume sampler variants identified as TE-6070, TE-6070-BL, TE-6070D, TE-6070D-BL, TE-6070V, TE-6070V-BL, TE-6070-DV, or TE-6070DV-BL, with or without the optional stainless steel filter media holder/filter cartridge or continuous flow/pressure recorder.

[*Federal Register:* Vol 67, page 15566, 04/02/02]

Wedding & Associates' or Thermo Environmental Instruments Inc. Model 600 PM_{10} High-Volume Sampler *Manual Reference Method:* **RFPS-1087-062**

"Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 600 PM_{10} Critical Flow High-Volume Sampler," consisting of the following W&A/TEII components: PM_{10} Inlet; Critical Flow Device; Anodized Aluminum Shelter; Blower Motor Assembly for 115, 220 or 240 VAC and 50/60 Hz; Mechanical Timer; Elapsed Time Indicator; and Filter Cartridge/Cassette, and with or without the following options: Digital Timer, 6 or 7 Day Timer, and 1 or 7 Day Pressure Recorder.

[*Federal Register:* Vol 52, page 37366,10/06/87]

Wedding & Associates' or Thermo Environmental Instruments Inc. Model 650 PM_{10} Beta Gauge *Automated Equivalent Method:* **EQPM-0391-081**

"Wedding & Associates' or Thermo Environmental Instruments, Inc. Model 650 PM_{10} Beta Gauge Automated Particle Sampler," consisting of the following W&A/TEII components: Particle Sampling Module, PM_{10} Inlet (18.9 liter/min), Inlet Tube and Support Ring, Vacuum Pump (115, 220 or 240 VAC and 50/60 Hz); and operated for 24-hour average measurements with glass fiber filter tape. [*Federal Register:* Vol 56, page 9216, 03/05/91]

PARTICULATE MATTER - $PM_{2.5}$

Andersen Model RAAS2.5-200 PM2.5 Ambient Audit Air Sampler *Manual Reference Method:* **RFPS-0299-128**
"Andersen Instruments, Incorporated Model RAAS2.5-200 PM2.5 Audit Sampler," configured as a $PM_{2.5}$ reference method and operated with software (firmware) version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-200 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L. [*Federal Register:* Vol 64, page 12167, 03/11/99]

BGI Inc. Models PQ200 or PQ200A $PM_{2.5}$ Ambient Fine Particle Sampler *Manual Reference Method:* **RFPS-0498-116**
"BGI Incorporated Models PQ200 and PQ200A $PM_{2.5}$ Ambient Fine Particle Sampler," operated with firmware version 3.88 or 3.89R, for 24-hour continuous sample periods, in accordance with the Model PQ200/PQ200A Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional Solar Power Supply or the optional dual-filter cassette (P/N F-21/6) and associated lower impactor housing (P/N B2027), where the upper filter is used for $PM_{2.5}$. The Model PQ200A is described as a portable audit sampler and includes a set of three carrying cases.
[*Federal Register:* Vol 63, page 18911, 04/16/98]

BGI Inc. Models PQ200-VSCC or PQ200A-VSCC $PM_{2.5}$ Sampler *Manual Equivalent Method:* **EQPM-0202-142**
"BGI Incorporated Models PQ200-VSCC or PQ200A-VSCC $PM_{2.5}$ Ambient Fine Particle Sampler," configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator (in lieu of a WINS impactor) and operated with firmware version 3.88, 3.91, 3.89R, or 3.91R, for 24-hour continuous sample periods, in accordance with the Model PQ200/PQ200A Instruction Manual and VSCC supplemental manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional Solar Power Supply or the optional dual-filter cassette (P/N F-21/6) and associated lower impactor housing (P/N B2027), where the upper filter is used for $PM_{2.5}$. The Model PQ200A VSCC is described as a portable audit sampler and includes a set of three carrying cases. [*Federal Register:* Vol 67, page 15567, 04/02/02]

Graseby Andersen Model RAAS2.5-100 PM2.5 Ambient Air Sampler *Manual Reference Method:* **RFPS-0598-119**
"Graseby Andersen Model RAAS2.5-100 PM2.5 Ambient Air Sampler," operated with software version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, configured for "Single 2.5" operation, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-100 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register:* Vol 63, page 31991, 06/11/98]

Graseby Andersen Model RAAS2.5-300 PM2.5 Sequential Ambient Air Sampler *Manual Reference Method:* **RFPS-0598-120**
"Graseby Andersen Model RAAS2.5-300 PM2.5 Sequential Ambient Air Sampler," operated with software version 4B, 5.0.1 - 6.09, 6.0A, or 6.0B, configured for "Multi 2.5" operation, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the Model RAAS2.5-300 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L. [*Federal Register:* Vol 63, page 31991, 06/11/98]

Rupprecht & Patashnick Partisol®-FRM Model 2000 PM-2.5 Air Sampler *Manual Reference Method:* **RFPS-0498-117**
"Rupprecht & Patashnick Company, Incorporated Partisol®-FRM Model 2000 PM-2.5 Air Sampler," operated with software versions 1.102 - 1.202, with either R&P-specified machined or molded filter cassettes, with or without the optional insulating jacket for cold weather operation, for 24-hour continuous sample periods, in accordance with the Model 2000 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register:* Vol 63, page 18911, 04/16/98]

Rupprecht & Patashnick Partisol®-FRM Model 2000 PM-2.5 FEM Air Sampler *Manual Equivalent Method:* **EQPM-0202-143**
"Rupprecht & Patashnick Co., Inc. Partisol®-FRM Model 2000 PM-2.5 FEM Air Sampler," configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator (in lieu of a WINS impactor) and operated with software versions 1.102 - 1.202, with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sample periods, in accordance with the Model 2000 Instruction Manual and VSCC supplemental manual, with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L, and with or without the optional insulating jacket for cold weather operation. [*Federal Register:* Vol 67, page 15567, 04/02/02]

Rupprecht & Patashnick Partisol® Model 2000 PM-2.5 Audit Sampler *Manual Reference Method:* **RFPS-0499-129**
"Rupprecht & Patashnick Company, Inc. Partisol® Model 2000 PM-2.5 Audit Sampler," configured as a $PM_{2.5}$ reference method and operated with software (firmware) version 1.2 - 1.202, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, in accordance with the Partisol® Model 2000 Operating Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L. [*Federal Register:* Vol 64, page 19153, 04/19/99]

Rupprecht & Patashnick Partisol® Model 2000 PM-2.5 FEM Audit Sampler *Manual Equivalent Method:* **EQPM-0202-144**
"Rupprecht & Patashnick Co., Inc. Partisol® Model 2000 PM-2.5 FEM Audit Sampler," configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator (in lieu of a WINS impactor), and operated with software (firmware) version 1.2 - 1.202, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, in accordance with the Partisol® Model 2000 Operating Manual and VSCC supplemental manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register:* Vol 67, page 15567, 04/02/02]

Rupprecht & Patashnick Partisol®-Plus Model 2025 Sequential Air Sampler *Manual Reference Method:* **RFPS-0498-118**
"Rupprecht & Patashnick Company, Incorporated Partisol®-Plus Model 2025 PM-2.5 Sequential Air Sampler," operated with any software version 1.003 through1.413, with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sample periods, in accordance with the Model 2025 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L. [*Federal Register:* Vol 63, page 18911, 04/16/98]

Rupprecht & Patashnick Partisol®-Plus Model 2025 FEM Sequential Sampler *Manual Equivalent Method:* **EQPM-0202-145**
"Rupprecht & Patashnick Co., Inc. Partisol®-Plus Model 2025 PM-2.5 FEM Sequential Air Sampler," configured with a BGI VSCC™ Very Sharp Cut Cyclone particle size separator (in lieu of a WINS impactor), and operated with any software version 1.003 through 1.413, with either R&P-specified machined or molded filter cassettes, for 24-hour continuous sample periods, in accordance with the Model 2025 Instruction Manual and VSCC supplemental manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L. [*Federal Register:* Vol 67, page 15567, 04/02/02]

Thermo Environmental Instruments, Incorporated Model 605 "CAPS" Sampler *Manual Reference Method:* **RFPS-1098-123**
"Thermo Environmental Instruments, Incorporated Model 605 "CAPS" Computer Assisted Particle Sampler," configured as a PM2.5 reference method and operated with software version 1.02A, for 24-hour continuous sample periods, in accordance with the Model 605 Instruction Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register:* Vol 63, page 58036, 10/29/98]

URG-MASS100 Single PM 2.5 FRM Sampler *Manual Reference Method:* **RFPS-0400-135**
"URG-MASS100 Single PM 2.5 FRM Sampler," operated with software (firmware) version 4B or 5.0.1, configured for "Single 2.5" operation, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the URG-MASS100 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register*: Vol 65, page 26603, 05/08/00]

URG-MASS300 Sequential PM 2.5 FRM Sampler *Manual Reference Method:* **RFPS-0400-136**
"URG-MASS300 Sequential PM 2.5 FRM Sampler," operated with software (firmware) version 4B or 5.0.1, configured for "Multi 2.5" operation, for 24-hour continuous sample periods at a flow rate of 16.67 liters/minute, and in accordance with the URG-MASS300 Operator's Manual and with the requirements and sample collection filters specified in 40 CFR Part 50, Appendix L.
[*Federal Register*: Vol 65, page 26603, 05/08/00]

NOTES

[1] Users should be aware that designation of this analyzer for operation on ranges less than the range specified in the performance specifications for this analyzer (40 CFR 53, Subpart B) is based on meeting the same absolute performance specifications required for the specified range. Thus, designation of these lower ranges does not imply commensurably better performance than that obtained on the specified range.

[2] This analyzer is approved for use, with proper factory configuration, on either 50 or 60 Hertz line frequency and nominal power line voltages of 115 Vac and 230 Vac.

Sources or Contacts for Designated Reference and Equivalent Methods

ABB Process Analytics
P.O. Box 831
Lewisburg, WV 24901
(304) 647-4358

Advanced Pollution Instrumentation, Inc.
[Refer to Teledyne - Advanced Pollution Instrumentation, Inc.]

Andersen Instruments
500 Technology Court
Smyrna, GA 30082-9211
(800) 241-6898
www.anderseninstruments.com

ASARCO Incorporated
3422 South 700 West
Salt Lake City, UT 84119
(801) 262-2459

Beckman Instruments, Inc.
Process Instruments Division
2500 Harbor Blvd.
Fullerton, CA 92634
(714) 871-4848

Bendix
[Refer to ABB Process Analytics]

BGI Incorporated
58 Guinan Street
Waltham, MA 02451
(781) 891-9380
www.bgiusa.com (bgiinc@attglobal.net)

Columbia Scientific Industries
11950 Jollyville Road
Austin, TX 78759
(800) 531-5003

Combustion Engineering
[Refer to ABB Process Analytics]

Dasibi Environmental Corp.
506 Paula Avenue
Glendale, CA 91201
(818) 247-7601
www.dasibi.com

DKK-TOA Corporation
29-10, 1-Chome, Takadanobaba,
Shinjuku-ku
Tokyo 169-8648, Japan
www.toadkk.co.jp

Ecotech Pty. Ltd.
12 Apollo Court
Blackburn, Victoria, 3130, Australia
+61 3 9894 2399
www.ecotech.com.au

Environnement S.A
111, bd Robespierre
78300 Poissy, France
www.environnement-sa.com
Instruments also available from:
Altech/Environnement U.S.A.
2623 Kaneville Court
Geneva, IL 60134
(630) 262- 4400

Environics, Inc.
69 Industrial Park Rd. E.
Tolland, CT 06084-2805
(203) 429-0077
www.environics.com

Graseby GMW
[Refer to Andersen Instruments]

Horiba Instruments Incorporated
17671 Armstrong Avenue
Irvine, CA 92714
(800) 446-7422
www.horiba.com

Lear Siegler
[Refer to Teledyne Monitor Labs, Inc.]

Commonwealth of Massachusetts
Department of Environmental
Quality Engineering
Tewksbury, MA 01876

Met One Instruments, Inc.
1600 Washington Blvd.
Grants Pass, OR 97526
(541) 471-7111
www.metone.com (metone@metone.com)

McMillan
[Refer to Columbia Scientific Industries]

Mine Safety Appliances
600 Penn Center Blvd.
Pittsburgh, PA 15235-5810
(412) 273-5101

Monitor Labs, Inc.
[Refer to Teledyne Monitor Labs, Inc.]

Opsis AB, Furulund, Sweden
Instruments also available from:
Opsis, Inc.
146-148 Sound Beach Avenue
Old Greenwich, CT 06870
(203) 698-1810
www.opsis.se

State of Oregon
Department of Environmental Quality
Air Quality Division
811 S.W. Sixth Avenue
Portland, OR 97204

PCI Ozone Corp.
One Fairfield Crescent
West Caldwell, NJ 07006
(201) 575-7052
www.pci-wedeco.com

Phillips Electronic Instruments, Inc.
85 McKee Drive
Mahwah, NJ 07430

Rupprecht & Patashnick Co.,Inc.
25 Corporate Circle
Albany, NY 12203
(518) 452-0065
www.rpco.com

Sibata Scientific Technology, Ltd.
1-25, 3-chome
Ikenohata, Taito-ku
Tokyo 110, Japan
81-3(3822)2272
TTani@email.msn.com

Teledyne - Advanced Pollution Instrumentation, Inc.
6565 Nancy Ridge Drive
San Diego, CA 92121-2251
(619) 657-9800
www.teledyne-api.com

Teledyne Analytical Instruments
16830 Chestnut Street
City of Industry, CA 91748
(626) 934-1622

Teledyne Monitor Labs, Inc.
74 Inverness Drive East
Englewood, CO 80112-5189
(303) 792-3300
www.teledyne-ml.com

Thermo Environmental Instruments, Inc.
8 West Forge Parkway
Franklin, MA 02038
(508) 520-0430
www.thermoei.com

Tisch Environmental, Inc.
145 S. Miami Avenue
Village of Cleves, OH 45002
(513) 467-9000
www.tisch-env.com

URG Corporation
116 Merritt Mill Road
Chapel Hill, NC 27516
(919) 942-2753

U.S. EPA
National Exposure Research Laboratory
Human Exposure & Atmospheric
Sciences Division (MD-46)
Research Triangle Park, NC 27711
(919) 541- 3737
www.epa.gov/heasd

Wedding and Associates, Inc.
[Refer to Thermo Environmental Instruments, Inc.]

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Method	Designation Number	Method Code
SO_2 Manual Methods		
Reference method (pararosaniline)	--	097
Technicon I (pararosaniline)	EQS-0775-001	097
Technicon II (pararosaniline)	EQS-0775-002	097
SO_2 Analyzers		
Advanced Pollution Instr. 100	EQSA-0990-077	077
Advanced Pollution Instr. 100A/100AS	EQSA-0495-100	100
Asarco 500	EQSA-0877-024	024
Beckman 953	EQSA-0678-029	029
Bendix 8303	EQSA-1078-030	030
Columbia Scientific Industries 5700	EQSA-0494-095	095
Dasibi 4108	EQSA-1086-061	061
DKK-TOA Corp. GFS-32	EQSA-0701-115	115
DKK-TOA Corp. GFS-112E, GFS-112E-1	EQSA-0100-133	133
Ecotech ML9850/EC9850, ML9850B/EC9850B	EQSA-0193-092	092
Environnement S.A AF21M	EQSA-0292-084	084
Environnement S.A AF22M	EQSA-0802-149	149
Environnement S.A. SANOA	EQSA-0400-138	138
Horiba Model APSA-360/APSA-360ACE	EQSA-0197-114	114
Lear Siegler AM2020	EQSA-1280-049	049
Lear Siegler SM1000	EQSA-1275-005	005
Meloy SA185-2A	EQSA-1275-006	006
Meloy SA285E	EQSA-1078-032	032
Meloy SA700	EQSA-0580-046	046
Monitor Labs 8450	EQSA-0876-013	513
Monitor Labs or Lear Siegler 8850	EQSA-0779-039	039
Monitor Labs or Lear Siegler 8850S	EQSA-0390-075	075
Opsis AR 500, System 300 (open path)	EQSA-0495-101	101
Philips PW9700	EQSA-0876-011	511
Philips PW9755	EQSA-0676-010	010
Teledyne-Advanced Pollution Inst. 100E	EQSA-0495-100	100
Teledyne Analytical Instruments 6400A	EQSA-0495-100	100
Teledyne Monitor Labs ML9850, ML9850B	EQSA-0193-092	092
Thermo Electron 43	EQSA-0276-009	009
Thermo Electron 43A or Thermo Environmental Instruments 43B, 43C	EQSA-0486-060	060
Wedding 1040	EQSA-0193-092	092
O_3 Analyzers		
Advanced Pollution Instr. 400/400A/400E	EQOA-0992-087	087
Beckman 950A	RFOA-0577-020	020
Bendix 8002	RFOA-0176-007	007
Columbia Scientific Industries 2000	RFOA-0279-036	036
Dasibi 1003-AH, -PC, -RS	EQOA-0577-019	019
Dasibi 1008-AH, -PC, -RS	EQOA-0383-056	056
DKK-TOA Corp. GUX-113E, GUX-113E-1	EQOA-0200-134	134
Ecotech ML9810/EC9810, -9810B, -9811, -9812	EQOA-0193-091	091
Environics 300	EQOA-0990-078	078
Environnement S.A $O_3$41M	EQOA-0895-105	105
Environnement S.A $O_3$42M	EQOA-0206-148	148
Environnement S.A SANOA	EQOA-0400-137	137
Horiba APOA-360	EQOA-0196-112	112
McMillan 1100-1	RFOA-1076-014	514
McMillan 1100-2	RFOA-1076-015	515
McMillan 1100-3	RFOA-1076-016	016
Meloy OA325-2R	RFOA-1075-003	003
Meloy OA350-2R	RFOA-1075-004	004
Monitor Labs 8410E	RFOA-1176-017	017
Monitor Labs or Lear Siegler 8810	EQOA-0881-053	053
Opsis AR 500, System 300 (open path)	EQOA-0495-103	103
PCI Ozone Corp. LC-12	EQOA-0382-055	055
Philips PW9771	EQOA-0777-023	023
Teledyne - Advanced Pollution Instr. 400E	EQOA-0992-087	087
Teledyne Monitor Labs ML9810/9810B, ML9811, ML9812	EQOA-0193-091	091
Thermo Electron or Thermo Environmental Instruments 49, 49C	EQOA-0880-047	047
Wedding 1010	EQOA-0193-091	091
CO Analyzers		
Beckman 866	RFCA-0876-012	012
Bendix 8501-5CA	RFCA-0276-008	008
Dasibi 3003	RFCA-0381-051	051
Dasibi 3008	RFCA-0488-067	067
Ecotech ML9830/EC9830, ML9830B/EC9830B	RFCA-0992-088	088
Environnement S.A CO11M	RFCA-0995-108	108
Environnement S.A CO12M	FRCA-0206-147	147
Horiba AQM-10, -11, -12	RFCA-1278-033	033
Horiba 300E/300SE	RFCA-1180-048	048
Horiba APMA-360	RFCA-0895-106	106
MASS - CO 1 (Massachusetts)	RFCA-1280-050	050
Monitor Labs 8310	RFCA-0979-041	041
Monitor Labs or Lear Siegler 8830	RFCA-0388-066	066
MSA 202S	RFCA-0177-018	018
Teledyne Advanced Pollution Instr. 300 or 300E	RFCA-1093-093	093
Teledyne Monitor Labs ML9830/9830B,	RFCA-0992-088	088
Thermo Electron or Thermo Environmental Instruments 48, 48C	RFCA-0981-054	054
Wedding 1020	RFCA-0992-088	088
NO_2 Manual Methods		
Sodium arsenite (orifice)	EQN-1277-026	084
Sodium arsenite/Technicon II	EQN-1277-027	084
TGS-ANSA (orifice)	EQN-1277-028	098
NO_2 Analyzers		
Advanced Pollution Instr. 200	RFNA-0691-082	082
Advanced Pollution Instr. 200A/200AU	RFNA-1194-099	099
Beckman 952A	RFNA-0179-034	034
Bendix 8101-B	RFNA-0479-038	038
Bendix 8101-C	RFNA-0777-022	022
Columbia Scientific Indust.1600, 5600	RFNA-0977-025	025
Dasibi 2108	RFNA-1192-089	089
DKK-TOA Corp GLN-114E, GLN-114E-1	RFNA-0798-121	121
Ecotech ML9841A/EC9841A,ML9841B/EC9841B	RFNA-1292-090	090
Environnement S.A. AC31M	RFNA-0795-104	104
Environnement S.A. AC32M	RFNA-0202-146	146
Environnement S.A. SANOA	EQNA-0400-139	139
Horiba APNA-360	RFNA-0196-111	111
Meloy NA530R	RFNA-1078-031	031
Monitor Labs 8440E	RFNA-0677-021	021
Monitor Labs or Lear Siegler 8840	RFNA-0280-042	042
Monitor Labs or Lear Siegler 8841	RFNA-0991-083	083
Monitor Labs ML9841	RFNA-1292-090	090
Opsis AR 500, System 300 (open path)	EQNA-0495-102	102
Philips PW9762/02	RFNA-0879-040	040
Teledyne-Advanced Pollution Inst. 200E	RFNA-1194-099	099
Teledyne Analytical Instruments 9110A	RFNA-1194-099	099
Teledyne Monitor Labs ML9841, ML9841A, ML9841B	RFNA-1292-090	090
Thermo Electron or Thermo Environmental Instruments 14B/E	RFNA-0179-035	035
Thermo Electron or Thermo Environmental Instruments 14D/E	RFNA-0279-037	037
Thermo Environmental Instr. 42, 42C	RFNA-1289-074	074
Wedding 1030	RFNA-1292-090	090
Pb Manual Methods		
Reference method (hi-vol/AA spect.)	--	803
Hi-vol/AA spect. (alt. extr.)	EQL-0380-043	043
Hi-vol/Energy-disp XRF (TX ACB)	EQL-0783-058	058
Hi-vol/Energy-disp XRF (NEA)	EQL-0589-072	072
Hi-vol/Flameless AA (EMSL/EPA)	EQL-0380-044	044
Hi-vol/Flameless AA (Houston)	EQL-0895-107	107
Hi-vol/Flameless AA (Omaha)	EQL-0785-059	059
Hi-vol/ICAP spect. (Doe Run Co.)	EQL-0196-113	113
Hi-vol/ICAP spect. (EMSL/EPA)	EQL-0380-045	045
Hi-vol/ICAP spect. (Illinois)	EQL-1193-094	094
Hi-vol/ICAP spect. (Kansas)	EQL-0592-085	085
Hi-vol/ICAP spect. (Montana)	EQL-0483-057	057
Hi-vol/ICAP spect. (NE&T)	EQL-1188-069	069
Hi-vol/ICAP spect. (New Hampshire)	EQL-1290-080	080
Hi-vol/ICAP spect. (Pennsylvania)	EQL-0592-086	086
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-109	109
Hi-vol/ICAP spect. (Pima Co.,AZ)	EQL-0995-110	110
Hi-vol/ICAP spect. (Rhode Island)	EQL-0888-068	068
Hi-vol/ICAP spect. (Silver Val. Labs)	EQL-1288-070	070
Hi-vol/ICAP spect. (TNRCC)	EQL-0400-140	140
Hi-vol/ICAP spect. (West Virginia)	EQL-0694-096	096
Hi-vol/WL-disp. XRF (CA A&IHL)	EQL-0581-052	052
PM_{10} Samplers		
Andersen Instruments RAAS10-100	RFPS-0699-130	130
Andersen Instruments RAAS10-200	RFPS-0699-131	131
Andersen Instruments RAAS10-300	RFPS-0699-132	132

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Method	Designation Number	Method Code
BGI Model PQ100	RFPS-1298-124	124
BGI Model PQ200	RFPS-1298-125	125
Oregon DEQ Medium volume sampler	RFPS-0389-071	071
Rupprecht & Patashnick Partisol 2000	RFPS-0694-098	098
R & P Partisol-FRM Model 2000	RFPS-1298-126	126
R & P Partisol-Plus Model 2025 Seq.	RFPS-1298-127	127
Sierra-Andersen/GMW 1200	RFPS-1287-063	063
Sierra-Andersen/GMW 321-B	RFPS-1287-064	064
Sierra-Andersen/GMW 321-C	RFPS-1287-065	065
Sierra-Andersen/GMW 241 Dichot.	RFPS-0789-073	073
Tisch Environmental Model TE-6070	RFPS-0202-141	141
W&A/Thermo Electron Mod 600 HVL	RFPS-1087-062	062
PM_{10} Analyzers		
Andersen Instruments Beta FH62I-N	EQPM-0990-076	076
Met One BAM1020, GBAM1020, BAM1020-1, GBAM1020-1	EQPM-0798-122	122
R & P TEOM 1400, 1400a	EQPM-1090-079	079
Thermo Andersen Series FH 62 C14 Beta Monitor	EQPM-1102-150	150
W&A/Thermo Electron 650 Beta Gauge	EQPM-0391-081	081
$PM_{2.5}$ Samplers		
Andersen Model RAAS2.5-200 Audit	RFPS-0299-128	128
BGI PQ200/200A	RFPS-0498-116	116
BGI PQ200-VSCC or PQ200A-VSCC	EQPM-0202-142	142
Graseby Andersen RAAS2.5-100	RFPS-0598-119	119
Graseby Andersen RAAS2.5-300	RFPS-0598-120	120
R & P Partisol-FRM 2000 PM-2.5	RFPS-0498-117	117
R & P Partisol-FRM 2000 PM-2.5 FEM	EQPM-0202-143	143
R & P Partisol 2000 PM-2.5 Audit	RFPS-0499-129	129
R & P Partisol 2000 PM-2.5 FEM Audit	EQPM-0202-144	144
R & P Partisol-Plus 2025 PM-2.5 Seq.	RFPS-0498-118	118
R & P Partisol-Plus 2025 PM-2.5 FEM Seq.	EQPM-0202-145	145
Thermo Environmental Model 605 CAPS	RFPS-1098-123	123
URG-MASS100	RFPS-0400-135	135
URG-MASS300	RFPS-0400-136	136
TSP Manual Method		
Reference method (high-volume)	--	802